a quarterly on Jainology

jain journal

जैन भवन

JAIN BHAWAN

CALCUTTA

VOL. XVIII JANUARY 1984 NO. 3

Rupee One & Paise Fifty

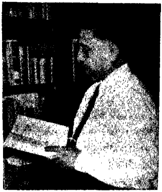
All contributions, which must be type-written, and correspondence regarding contributions and book-reviews should be addressed to the Editor, Jain Journal, P-25 Kalakar Street, Calcutta-7

For advertisement and subscription please write to the Secretary, Jain Bhawan, P-25 Kalakar Street, Calcutta-7. Subscription for one year: Rs. 5.00: for three years: Rs. 12.00. Foreign: Rs. 15.00 for one year.

Published by Moti Chand Bhura on behalf of Jain Bhawan from P-25 Kalakar Street and printed by him at The Technical & General Press, 17 Crooked Lane, Calcutta-69.

Editor : Ganesh Lalwani

Contents



Late Professor K. C. Lalwani

Professor K. C. Lalwani who died in Calcutta on December 10, 1983 *was born in* 1921 *at Rajshahi (now in Bangladesh) and took his Master's Degree with a First Class from the University of Calcutta in* 1943. *He taught Economics and Commerce at Calcutta, Poona and Delhi, before joining the Indian Institute of Technology at Kharagpur in West Bengal in* 1954. *He had published many books and innumerable papers in Economics, Commerce, Political Science, Religion, Historiography, Educational Sociology and Contemporary United States. In* 1960-61, *he went to the United States on a one-year assignment when he addressed seminars at several Universities and attended and participated in professional gatherings. He travelled widely in the United States and six countries of western Europe. Around* 1967, *he entered into another new field Jainology, wherein he had published several volumes. His work on the Bhagavati Sutra which he could not complete had been hailed by Prof. Suniti Kumar Chatterjee as his magnum opus. His treatise on the life and doctrines of Mahavira had been reviewed in the United States as the best work on the subject. His lucid exposition of Jaina Stories had proved popular with the English-reading public. As a mark of our respect to this departed scholar we are reprinting an article written by him on the occasion of* 2500*th Nirvana Anniversary of Bhagavan Mahavira and published in The Statesman dated April* 29, 1975

Bhagavan Mahavira : His Life and Doctrines

K. C. Lalwani

In the sixth century B.C., when human society has reached its 'adolescence' and men's minds were astir 'from Athens to the Pacific', a large number of religious reformers and spiritual leaders appeared in different parts of the world. Bhagavan Mahavira, the 24th Tirthankara of the Jainas, was one of them.

It will be wrong to suggest that Mahavira was the founder of Jainism, since according to tradition, there were 23 more Tirthankaras before him, each appearing with a time gap of a few centuries from his predecessor, and of these, the 23rd, Arhat Parsva, has been identified by historians as a prince from Varanasi, and the 22nd, Arhat Aristanemi, happened to be the cousin of Bhagavan Krsna. The first Tirthankara, Rsabha, a prince from Ayodhya, had been noticed in the early *Vedas* (*Rig Veda* X. 166). He gave the religion of the Jinas with its root deep in antiquity.

Bihar is the cradle of Jainism, though its founder, Rsabha, was born at Ayodhya, 22 out of 24 Tirthankaras, including Bhagavan Mahavira were born in Bihar and achieved *nirvāṇa* in that State, 20 of them passing away on the Parsvanath Hills in Bihar, traditionally called Sammeta Sikhara. Strictly speaking, this region was outside the pale of Aryan expansion, the traditional 'Middle Country' and was ruled by the Vratya Ksatriyas, who were the believers of the *Vratas* or Vows. It is no wonder then that all the early rulers of Rajagrha, and later at Pataliputra, till the appearance of the Guptas, belonged to one or other form of Sramana religion, which in the post-Mahavira period acquired the name of Jainism. Even Buddhism was a form of Sramana religion.

History

It has been the fancy of Indo-Aryan writers of Indian history to present both Mahavira and the Buddha as the two most successful and illustrious leaders of the 'reaction' against the rituals and sacrifices of the Brahmanical religion. It is far from true and it is necessary to recognise that the Sramana and Brahmana currents of religion were independent and mutually exclusive of, and had nothing to do with, each other. Had they been leaders of 'reaction' their antagonism to the religion of the *Vedas*

would have found vent in some form or other and would have been recorded in their literatures. But nowhere in the Jaina *Agamas* or the Buddhist *Tripiṭakas* does one come across any mention of the Vedic religion, still less any rancorous or malicious expression against it. This should establish that neither Jainism nor Buddhism was a 'reaction', but both emerged and existed in their own rights. Once this fact is recognised, the entire outlook of Indian history gains a new perspective.

Mahavira and Buddha

Western scholars identified Jainism from Buddhist sources in which Mahavira has been called Nigantha Nataputta (Nirgrantha Jnataputra) and his followers Niganthas. Some have gone to the extent of calling Mahavira and the Buddha the same persons, and Jainism as an offshoot of Buddhism. "From all credible testimony . . . it is impossible to avoid the inference that the Jainas are a sect of a comparatively recent institution who came into power and patronage about the 8th and 9th centuries, they probably existed before that as a division of the Bauddhas." (*Works of Wilson*, 1861, Vol I, p. 334). Thanks to the researches of two German scholars Hermann Jacobi and George Buehler, Jainism is no longer considered to be a mere offshoot of Buddhism, but an independent and earlier system. Jacobi wrote : ". . . . As it is inconsistent with our assumption of a contemporaneous origin of both the creeds, we are driven to the conclusion that the Nirgranthas were not a newly founded sect of the Buddha's time. This seems to have been the opinion of the *Piṭakas*, too."

In the sixth century B.C. there were 363 rival schools of Sramana religion in Bihar centering round nine fundamentals (*nava tatva*) which differed from one another in matters of minor details. More important of these were *Kriyāvāda*, *Ajñānavāda*, *Vinayavāda*, and *Cāturyāma* religion of Parsva. It is a part of the spiritual mission of a Tirthankara to counteract all rival schools within the fold of his religion and effect a unification of the church, which Mahavira did. Of these 363 schools the one that proved the most formidable was the Ajivaka sect headed by one Gosalaka who was fatalist and believed in human life to be a thing determined rather than itself being the determinant of things.

The Jaina texts have noticed the rivalry of this man at several places. As to the absorption of the remnants of the order of Parsva into that of Mahavira, there are on record many occasions when the monks of the earlier order met those of Mahavira's order, discussed their differences, and being convinced that Mahavira was the leading light for the new age,

joined his order. A new light was indeed emerging at the same time from Gautama Buddha who was a junior contemporary of Mahavira, and even though the Buddhists were immensely 'interested' in the followers of Nigantha Nataputta, the reverse was not the case. To quote, "I have not yet come across a distinct mention of the Bauddhas in any of the old Jain *Sūtras*." (Jacobi). The most significant fact is that even though Mahavira and the Buddha were contemporaries for many years and lived and moved in the same part of India at times residing in the same city, the two never met.

Vaisali Confedaracy

The line to which Mahavira belonged was identified by Western scholars from the Buddhist texts in which he has been called 'Nataputta'. As Buehler wrote, "The discovery of the real name of the founder of the Jainas belongs to Prof. Jacobi and myself. The form 'Jnataputra' occurs in Jaina and north Indian Buddhist books, in Pali it is 'Nataputta' and in Jaina Prakrit 'Nayaputta'." (*Indian Antiquary*, Vol VII, p. 143) This establishes beyond doubt that Mahavira was born in the Jnatr clan of the Vajjis who were the rulers at vaisali and was well connected from his parents side. According to Rhys Davids and Cunningham the Vajjis to whom the Jnatrs belonged were a large confedaracy which had within its fold at least eight clans (*atthakulas*), of which the Videhans, Licchavis, the Jnatrs and the Vajjis proper were the foremost. The Videhans had their capital in Mithila, but a section of them might have settled in Vaisali, and Mahavira's mother, sister of king Cetaka of the Haihaya dynasty, and the head of the Confederacy, probably belonged to this section. The Jnatrs had their seat at Kundapura or Kundagrama and Kollaga, both suburbs of Vaisali which has been identified with Besarh (to the east of Gandak) in the Muzaffarpur district of Bihar. This city was also the seat of the entire confederacy. People were called 'inner Vesalian' or 'outer Vesalian' according to their residence in the city proper or in the suburbs, and by this criterion, Mahavira was an outer Vesalian.

Kalpa Sūtra by Bhadrabahu which is the traditional source on the life of Mahavira, who is supposed to have been born in 599 B.C. and initially named Vardhamana is an event-free record of his life in which his birth is narrated at some length, followed by his exit being not a response to any challenge, as it happened in the case of Guatama Buddha, but in fulfilment of a mission, his attainment of the supreme knowledge at 42 and ultimately his *nirvāṇa* at 72. The only important event noticed in the *Kalpa Sūtra* is that immediately after Mahavira's *nirvāṇa*, 18 princes who were present there declared : "The light of intellect is gone ; let us

light earthen lamps." The hardships undergone by Mahavira as a monk, his differences with other schools of Sramana religion and unification of the remnants of the church of Parsva with that of Mahavira have been described at length in some of the older canonical texts. The myth about his life on which contemporary biographies of Mahavira are based must have developed long after his *nirvāṇa* by people who had never seen and known him personally. The Digambara sources on Mahavira's life, *Adipurāṇa* and *Uttarapurāṇa*, were produced in the medieval period and were to a large extent based on myth.

Although we do not have details about the first 30 years of his life at the palace, it is certain that for the greater part of it he lived like a prince. This did not prevent his final exit. As a boy, he was endowed with a strong and graceful body, was fearless, courageous and intelligent and was by nature serious and grave. He desired to quit the palace at 28 but deferred it by a couple of years at the request of his elder brother. Thereafter he started his career as a monk with the motto 'all sinful acts become unworthy of my indulgence', and this part of his life lasted 12 years during which he visited different parts of the country, including 'non-Aryan' Radha and Singhabhumi and Vajjabhumi in West Bengal and underwent severe hardships. In the 13th year enlightenment came to him. This made him Mahavira or the Great Hero. As an omniscient personality, he lived for 30 years fulfilling his spiritual mission and inspiring and setting people on the road to liberation. If we are to believe in the account of the *Kalpa Sūtra*, the Church of Mahavira included within its fold several thousand persons outstanding in one field or the other. At the age of 72, Mahavira passed away in perfect health and while delivering his last sermon, at Madhyama Pava, which it is widely believed to be near Nalanda.

Metaphysics

Metaphysics for which another name is ontology, is devoted to the consideration of real or reals. It has been the unanimous finding of all religions that God is the only real, God transcendental more than God immanent so that everything else is unreal, a mere illusion or falsehood, or a mere manifestation of the will of the real. The Jainas have not viewed reality in this manner. To them, whatever exists is real or reality in existence. This makes the universe as well as life real, because they are eternal, ever-existent and never to end, though they assume and pass through innumerable modes and categories. This subtle doctrine has been expressed by Mahavira in three words : *utpāda-dhrauvya-vyaya* or genesis-permanence-destruction. This is as much true of the universe of animate

as of that of inanimate beings. At any moment these souls are in bondage, with matter, and to regain their pristine purity, right religious endeavour is necessary. This is the sole object of Jaina metaphysics, or, in other words their analysis of soul and matter is intended to restore liberation of the soul.

In modern terminology a developed personality like Mahavira desired to find a way out for himself, not as an escapist, but as an active performer from the artificialities and complexities of human life and to uphold the same for mankind. It is this that is *nirvāṇa* in Jaina terminology. Mahavira's exit from his father's palace is therefore symbolic; in doing so, he lost himself beyond himself, and by dint of severe spiritual excercises over 12 years, he became the heart and centre of his own transcendence, a virtual God-head.

Five Words

The ethics that Mahavira gave to purify human life is expressed in five words—non-violence, non-falsehood, non-sex, non-theft and non-accumulation. In rigorous form, they are a must for the monks but in a slightly less rigorous form, to make them consistent with worldly duties and responsibilities, they are must for lay followers too, implying thereby that a Jaina is one not because he is born in a Jaina family, but because by faith and practice, he fulfils the prescribed ethics. As an active performer himself, Mahavira prescribed a conscious effort on the part of the human soul to liberate itself from bondage. For this purpose a human being has the necessary equipment, consciousness, intellect, perception, etc. Besides, he has facilities, texts, discussions and discourses so that instead of remaining a tool in the hands of destiny, man may liberate himself totally from it. In other words, the Jainas firmly believe in the English maxim 'man is the architect of his own future'. This not only makes Jaina ethics an ethics of personal as well as social responsibility, but also provides a definite system to the religion.

In doing so, the Jainas have called *ashimsā* as *paramo dharmah*, or the highest religion. When the soul indulges in *himsā*, it deviates, from its right postures and trespasses into triviality. *Ahimsā* in the Jaina view is not compassion, pity or sympathy to one who is lower or inferior in status, position or capacity, but a right to live unmolested. *Ahimsā* thus becomes the great instrument of self-determination to be used and applied, as Gandhiji said, by one who has perfect control over self.

Bibliography of Books written by Prof. K. C. Lalwani

Economics

Niyog Visayak Arthasastrer Vislesan *(in Bengali)* 1948
Paura Vijnan (in Bengali) 1947, (jointly with Khagen Sen) 1950
Arthasastrer Ruprekha (in Bengali) 1948
Marxiya Arthasastra (in Bengali) 1948
Svadhin Bharat O Tahar Arthanaitik Sangathan (in Bengali jointly with Dhiresh Bhattacharyya) 1948
Niyog, Sud O Taka Visayak Vyapak Siddhanta (in Bengali) 1982
Arthanaitik Sabdakosh (published in Arthik Prasanga in Bengali)
Bharatki Arthik Samasyaye (in Hindi) 1950
Towards Marxian Destination
Indian Business Vol I 1948
Indian Business Vol II 1949
Industrial Efficiency in India 1949
Money 1947, 1950, 1958
Agricultural Economics 1951, 1954/Rural Economics & Cooperation 1963
Banking 1951, 1960
Industrial Economics 1952, 1957/Industrial Development 1963
Labour Economics 1953, 1961/Economics of Industrial Labour 1965, 1969
Economic Planning 1955, 1957
Indian Economics 1958
Indian Capital Market 1959
Indian Planning 1959
India's Third Plan 1961
Third Five Year Plan 1962
From Gold Rush to the Battle for Francs (jointly with Gita Lalwani) 1969
Monographs on Indian Economic Problems—about 1948
Indian Struggle and Indian Constitution 1950
Innumerable articles and reviews

History & Social Philosophy

Burden of the Past (Indian History—Hindu Period) 1974
Medieval Muddle (Indian History—Muslim Period) 1978
Sun Set in India (Indian History—British Period)—not published
Articles on Contemporary America (published in Radical Humanist)

Religion

Srimadbhagvatgita (in Bengali verse)

Jainism

Bhagavati Sutra Vol I 1973
Bhagavati Sutra Vol II 1974
Bhagavati Sutra Vol III 1980
Bhagavati Sutra Vol IV—not published
Dasavaikalika Sutra 1973
Uttaradhyana Sutra 1977
Kalpa Sutra 1979
Aupapatika Sutra—not published
Sraman Bhagavan Mahavira (Life) 1975
Jain Stories of Muni Mahendra Kumar Pratham : English rendering Vol I-III 1973, 1974, 1980
Agam aur Tripitak Vol I of Muni Nagraj : English rendering—not published
A Pitcherful from Mighty Ocean (Pen-sketch of Muni Nagraj)
Tirthankara Mahavira and His Sarvodaya Tirtha of Hukum Chand Bharilla : English rendering 1981
Besides many articles, reviews and tracts

Notion of Declination Implied in the Concept of Mandala (Diurnal Circle) in Jaina School of Astronomy

SAJJAN SINGH LISHK

Jainas had a strange theory of two Suns and two Moons moving in circles round the mount Meru[1] placed at the centre of Jambudvipa, the central island of flat earth[2] made up of concentric rings of land masses alternatively surrounded by ocean rings.[3] According to Jaina canonical literature,[4] one solar or one lunar *mandala* (diurnal circle) was described by two Suns or two Moons respectively, each Sun or Moon describing one half. However, for all practical purposes of calculations only one Sun or one Moon suffices.[5] Here an attempt has been made to probe into the concept of *mandala* and it is revealed that the Jainian concept of *mandala* alludes to the notion of declination.

[1] The mount Meru possesses certain polar characteristics According to Tilak, Meru is the terrestrial north pole of the Hindus. (See Tilak, B. G., *The Arctic Home in the Vedas*, 1971, pp. 55-60.)
According to our exposition, the mount Meru as described in Jaina canonical works, represents Jaina tentative astronomical model. (See our paper 'Notion of Obliquity of Ecliptic implied in the Concept of Mount Meru in Jambudvipa Prajnapti', paper presented at 7th session of Jain Vidya Parishad, JVB, Ladnun and published in *Jain Journal* Vol. 12, No. 3, pp. 79-92.) However for more details, see S. S. Lishk's Ph. D. thesis 'Mathematical Analysis of Post-Vedanga Pre-Siddhantic Data in Jaina Astronomy', Panjabi University, Patiala (1977).

[2] For more details, see our paper 'Notion of Circular Flat Earth in Jaina Cosmography', *The Jain Antiquary*, Vol. 28, Nos. 1-2, pp. 1-5 (Arrah).

[3] Bose, D. M., Sen, S. N. and Subarayappa, B. V. (1971), *A Concise History of Science in India*, p. 80, INSA, New Delhi.

[4] Jaina canonical literature comprises of sacred texts of the Jaina sect in India. Its present recension is generally ascribed to the council of Valabhi under the presidency of Devardhi Ganin which met in 5th or 6th century A.D. The principal sources of Jaina astronomical texts are *Surya Prajnapti* (=*SP*), *Candra Prajnapti*, *Jambudvipa Prajnapti* (=*JP*) and also *Sthananga Sutra*, *Anuyogadvara Sutra* etc. Some later works like *Tiloya Pannatti* and *Trilokasara* etc. are also of much interest. However, for more details, see our paper 'Sources of Jaina Astronomy', *The Jain Antiquary*, Vol. 29, Nos. 1-2, pp. 19-32 (Arrah). In this paper, quotations (English version only) of *JP* and *SP* texts refer to the respective works;(Hindi commentary with original Prakrit text) by Amolak Rishi, Mahavir era 2445 (Sikandrabad).

[5] See also Jain, L. C (1975), 'Kinematics of the Sun and the Moon in Tiloya Pannatti', *Tulsi Prajna*, Vol. 1 No. 1, pp. 60-67 (Ladnun).

1. *Solar Mandalas (Sun's Diurnal Circles)* :

(i) *Number of Solar Mandalas* :

As regards the number of solar *mandalas*, *Jambūdvīpa prajñapti* (=*JP*) 7.2 states as :

"There are 65 solar *mandalas* stretched over 180 *Yojanas* of Jambudvipa (isle of Jambu tree) and 119 solar *mandalas* stretched over 330 *Yojanas* of the Lavanasamudra (salt ocean). In all there are 184 solar *mandalas* in both Jambudvipa and Lavanasamudra."

Evidently the entire stretch of 184 solar *mandalas*, measured in *Yojanas*,[6] is computed as the sum of their respective stretches over Jambudvipa and Lavanasamudra.

Total stretch of the solar *mandalas* = 180+330
= 510 *Yojanas*.

(ii) *Linkage of Solar Mandalas (Sun's Diurnal Circles) with Sun's Annual Course* :

The mode of linking solar *mandalas* with Sun's annual course is depicted in *Sūrya Prajñapti* (=*SP*). *SP*.1.1.4-5 states as :

"When the Sun treading upon *mandala* to *mandala*, moves from the innermost *mandala* (Sun's diurnal circle on Summer solstice day) upto the outermost *mandala* (Sun's diurnal circle on Winter solstice day) and from the outermost *mandala* to the innermost *mandala*, how much time in days and nights is required ?

[6] *Yojana* is a linear measure of length. Its magnitude had been changing from time to time and place to place. For example, according to *Anuyogadvara Sutra* (=*ADS*) different types of *yojanas* are related as :

1 *pramana yojana* = 500 *Atma yojana*
= 1000 *Utsedha yojana*

we have denoted '*atma yojana*' (*ADS* units) by 'y' (*yojana*) and 'Y' (*Yojana*) denotes the measure of length as implied in *Tiloya Pannatti* (=*TP*). We have exposed that

$$1 \text{ Y}(TP \text{ unit}) = \frac{500}{8} \text{ y } (ADS \text{ unit})$$

= 6.37 miles (British road distances)

For more details, see our paper 'The Evolution of Measures in Jaina Astronomy', *Tirthankar*, Vol. 1, No. 7-12, pp. 83-92 (Indore). See also our paper 'Length Units in Jaina Astronomy', *Jain Journal*, Vol. 13, No. 4, pp. 143-154.

"(The required period) is 366 days and nights.

"How many *mandalas* does Sun tread upon during this period—twice upon how many *mandalas* and once upon how many *mandalas* ?

"(During this period, the Sun) treads upon 184 *mandalas*—twice upon 182 *mandalas* i.e. while (once) going outward (towards the outermost *mandala*) and (then) coming inward (towards the innermost *mandala*) (and) once upon two *mandalas* i.e. the innermost *mandala* (and) the outermost *mandala*."

Evidently, the exact number of solar *mandalas*
$=2 \times 182+2=366$..(1)

Thus in 366 days and nights the sun treads upon 366 solar *mandalas.*

Velocity of Sun across the solar *mandala*
$=1$ solar *mandala*/day (day and night).................................(2)

(*iii*) *Distances of Solar Mandalas (Sun's Diurnal Circles) from Meru :*

As regards the north-south distances of solar *mandalas* from Meru, *JP*.7.4-5 states as :

"The innermost solar *mandala* (Sun's diurnal circle on Summer solstice day) is 44820 *yojanas* distant (from Meru). Second to the inner most *mandala* is $44822\frac{48}{61}$ *yojanas* distant (from Meru). Third to the innermost *mandala* is $44825\frac{35}{61}$ *yojanas* (distant from Meru). By increasing the distance by $\frac{48}{61}$ *yojanas* per *mandala*, the Sun (finally) reaches the outermost *mandala* (Sun's diurnal circle on Winter solstice day). The outermost *mandala* is 45330 *yojanas* distant from Meru."

Here it is worthy of note that as per our exposition[7] of Jaina tentative astronomical model of Meru, true axis of earth passes along the hypotenuse of the approximate cone (made up of frustrum of cones) of Meru and thus the axis of Meru passes through the earth at a distance of 5000 *yojanas* (radius of base of Meru on flat earth) from the true axis of earth. In the light of this discussion, it seems plausible that the earth distance

[7] See ref. No. 1.

of any solar *mandala* (Sun's diurnal circle) from periphery of Meru's cross-section on flat earth denotes its angular distance from north pole. Probably this is why distance of any solar *mandala* is given here from periphery of base of Meru on flat earth and not from axis of Meru and this distance may therefore conveniently be called as equivalent to north polar distance (NPD) of the particular solar *mandala* (Sun's diurnal circle) or NPD of the Sun while occupying that particular *mandala*.

Thus evidently we have $\frac{d}{dt}(\text{NPD}) = 2\frac{48}{61}$ *Yojanas*/solar *mandala*

Or with the application of eq. No. (2) it may be written as

$\frac{d}{dt}(\text{NPD}) = 2\frac{48}{61}$ *Yojana*/day (day and night).

Integrating both sides, we have

$$\text{NPD} = \int_{0}^{n} 2\frac{48}{61}\,dt \textit{ Yojanas}+c \quad \ldots\ldots(3)$$

where c = Constant

n = Number of solar *mandalas* (Sun's diurnal circles) already embraced by Sun in its southern course or yet to be embraced in its northern course.

Applying initial conditions i.e., when the Sun occupies the innermost *mandala* (Sun's diurnal circle on Summer solstice day),

NPD = 44820 y, and n = 0,

from eq. No. (3), we have

c = 44820 y,

Eq. No. (3) can be written as

$$\text{NPD} = \int_{0}^{n} 2\frac{48}{61}\,dt \textit{ Yojanas}+44820 \text{ y} \quad \ldots\ldots(4)$$

Thus NPD of any solar *mandala* (Sun's diurnal circle projected on earth's surface) can be tout de suits reckoned from this equation. For example, when the Sun occupies the outermost *mandala* (Sun's diurnal circle on Winter solstice day)

n=183 solar *mandalas*.

NPD of the outermost *mandala* $= \left[2\frac{48}{61} n \right]_0^{183}$ *Yojanas*+44820 y

$= 510$ Y+44820 y

=Numerically 45330 y..(5)
(as given)

The mystery of intermingling Y (*Yojana*, *TP* unit) and y (*ātma yojana*, *ADS* unit) in the computation of NPD of solar *mandala* as depicted in eq. No. (5) will be resolved in due time as we come to this point later. The proof of pudding lies in eating.

Now it is tout a fait in the vicinity of thought that Jaina concept of *mandala* (diurnal circle) implies a notion of NPD of solar *mandala* or of Sun occupying that particular *mandala*. Thus notice of declination (complement of NPD) is also implied therein, though irrespective of the position of the equator.

Total variation of declination = Total variation of NPD
= 510 Y.................................(6)

One may ponder over the non-algebraic character of this concept of declination i.e. the declination does not increase on both sides of the equator. This is de facto attributable to the development of Jaina peculiar notion of flat earth by virtue of which exponents of Jaina School of astronomy remained aloof from developing any notion like that of equator. Their theory of ever increasing (or decreasing) NPD of the solar *mandalas* (Sun's diurnal circles) in Sun's southern course (or northern course) might have probably led them develop their tentative model of flat earth but in due time Jainas became so convinced of the use of their notion of flat earth in explaining their cosmic view points that they failed to take up the problem of variation of NPD de novo. Thus the notion of equator might have escaped their attention.

Now let us probe into the rationale of distribution of solar *mandalas* (Sun's diurnal circles) between Jambudvipa and the Lavanasamudra.

Let

N_j = Number of solar *mandalas* in Jambudvipa = 65

N_l = Number of solar *mandalas* in Lavanasamudra = 119

D_j = North-south stretch of solar *mandalas* in Jambudvipa = 180 Y

D_1 = North-south stretch of solar *mandalas* in Lavanasamudra = 330 Y

Now because,

$$\frac{N_1}{N_j} = \frac{119}{65} = 1 + \frac{1}{1+}\;\frac{1}{4+}\;\frac{1}{6+}\;\frac{1}{2}$$

and

$$\frac{D_1}{D_j} = \frac{330}{180} = 1 + \frac{1}{1+}\;\frac{1}{5}$$

Therefore we may fairly presume by inspection that

$$\frac{N_1}{N_j} \backsim \frac{D_1}{D_j}$$

Since

$$\frac{N_1}{N_j} \times D_j = \frac{119}{65} \times 180 = 329.54 \text{ or } 330 \text{ Y approx.}$$

$$\approx D_1$$

The following relation fairly holds good, i.e.

$N_1 : N_j :: D_1 : D_j$ ....(7)

This leads us to the view that the north-south stretch 330Y of solar *mandalas* in the Lavanasamudra might have been theoretically generated through a simple linear zigzag manner probably as shown above. This view is further evidenced by its inherent dependence upon the factual determination of the relation between number of solar *mandalas* N_j and their north-south stretch D_j in Jambudvipa. This is elucidated as follows :

Obliquity of ecliptic = 23°.5
Sun's maximum declination δ max = 23°.5

Using eq. No. (6), we have

$510 \text{ Y} = 2\ \delta \text{ max} = 47°$ ....(8)
$D_j = 180 \text{ Y} = 16°.6$
$= 23°.5 - 6°.9$

It suggests that north-south stretch D_j of *mandalas* (Sun's diurnal circles) in Jambudvipa is extended southward from Sun's extreme north position 23°.5 upto 6°.9 in the northern hemisphere as we understand

it these days. This also implies that north-south stretch D_1 of solar *mandalas* in Lavanasamudra starts from 6°.9 North, the southern limit of D_1, verisimilarly coinciding with the southern limit of ancient India including modern 'Sri Lanka'. Besides, it may be confirmed from Nautical Almanac that declination of Sun decreases from its maximum value on Summer solstice day to about 7° North in a span of about 75 days and to about 8°.5 North (southern limit of modern India)[8] in a span of about 70 days.[9] Thus it seems convincing that verisimilarly the southward journey of Sun was measured in *Yojanas* starting from a station on earth where the noon-shadow-length of gnomon was zero on the Summer solstice day i.e. starting from a station situated in the neighbourhood of terrestrial latitude of 23°.5 North (which is incidently very close to the latitude of Ujjain, a renowned seat of ancient Indian culture) upto the station situated at about the extreme southern limit of ancient India where again the noon-shadow-length was observed to be zero after 65 days since Summer solstice day. This also testifies their technique of measuring celestial angular distances in terms of corresponding distances projected over the surface of the earth.[10]

However, it is worthy of note that a small discrepency in reckoning the number of solar *mandalas* in Jambudvipa to be 65 instead of 70 or 75 as ought to have been as shown above, was due to obstacles in measuring the moon-shadow-length. Several errable factors like the ending of shadow in penumbra, slow velocity of shadow length near the meridian transit of Sun and slight inclination of gnomon etc. are pertaining thereto.[11] Besides it cannot be claimed with certainty as to which place on the sea coast might have been mistaken for the southern extremity of their land which was supposed to be a circular land mass surrounded by the ocean ring (Lavana samudra). (Incidently, in 65 days since Summer solstice day, Sun's declination becomes about 10° North. This might refer to some place in modern Kerala state.) Keeping in view these very factors, it is contemplable that Jainas had actually measured in *Yojanas*, total change in Sun's declination (or variation in NPD as Jainas understood) in 65 solar *mandalas* (Sun's diurnal circles) in Sun's southern journey starting from the innermost *mandala*

[8] See Bartholomew, J. (1960), *The Graphic Atlas*, 11th Ed., p. 53.

[9] See Lahiri, N. C. (1975), *Indian Ephemeris*, pp. 18-24. See also *Indian Nautical Alumanac*.

[10] See our paper 'Role of Pre-Aryabhata Jaina School of Astronomy in the Development of Siddhantic Astronomy', paper presented at Celebration of the 1500th birth anniversary of Aryabhata I (Nov. 2-4, 1976). INSA, New Delhi. *IJHS*, Vol. 12, No. 2, pp. 106-113.

[11] Smith, D.E. (1958), *History of Mathematics*, Vol. 2, p. 671 (New York).

(diurnal circle on Summer solstice day). Having known the length of Sun's annual course (366 days) and following the notion that each of the extreme solar *mandalas* is traversed over only once during Sun's annual course, total number of solar *mandalas* was taken to be $\frac{366}{2}+1$ i.e. 184. N_1 ($=184-N_j$) was easily calculated to be 119. Then D_1 might have been theoretically computed through relation (7). Further they employed a simple linear zigzag function to distribute the total north-south stretch 510 *Yojanas* between extreme solar *mandalas* uniformly among all the solar *mandalas*. Thus NFD increases by $2\frac{48}{61}$ *Yojanas* per solar *mandala* from innermost solar *mandala* upto outermost solar *mandala* and vice versa. This exhibits their inefficiency to grasp the real variation in Sun's declination or NPD of solar *mandalas* as they understood it in their terms.

Now let us make a further probe into the relationale of computation of NPD of solar *mandalas*. It may be recalled that

Radius of Jambudvipa	= 50000 y
Radius of the mount Meru's base on flat earth	= 5000 y

It may be recollected here that as per our exposition of Jaina tentative astronomical model of Meru, true axis of earth passes along the hypotenuse of the approximate cone (made up of frustrum of cones) of Meru and thus the tentative axis of Meru passes through the earth at a distance of 5000 y (radius of base of Meru on flat earth) from the true axis of earth. And on the other hand, the innermost solar *mandala* (Sun's diurnal circle on Summer solstice day) is situated 180 Y inside Jambudvipa.

NPD of the innermost solar *mandala* or its shortest distance from periphery of Meru's base on flat earth

=(Radius of Jambuvdipa—radius of Meru's base on flat earth) —distance of innermost solar *mandala* from periphery of Jambudvipa.

=(50000—5000)y—180 Y

= Numerically 44820 y..(9)

It may also be recalled that the tentative axis of Meru lies on the circumference of *samatala bhūmi* (earth having plane surface denoting circular area with centre at the projection of pole of ecliptic)[12] On

[12] Sharma, S. D. and Lishk, S.S. (1975), 'Latitude of the Moon as determined in Jaina Astronomy', *Sraman*, Vol. 27, No. 2, pp. 28-35 (Varanasi).

summer solstice day, height (celestial co-latitudinal distance projected along surface of earth) of Sun above *samatala bhūmi* (earth having plane surface denoting circular area with centre at the projection of pole of ecliptic) is 800 Y. Radius of Jambudvipa with axis of Meru passing through its centre is 50000 y. As we have expounded[13] that periphery of Jambudvipa coincides with the parallel of maximum declination of the Sun, so height of Sun occupying innermost *mandala* above *samtala bhūmi* (distance of Sun occupying innermost *mandala* from axis of Meru) is equivalent to radius of Jambudvipa i.e. 800 Y = 50000 y............(10)

$$1\ Y = \frac{500}{8} y$$

$$80\ Y = 5000\ y \quad \ldots\ldots(11)$$

Substracting eq. No. (11) from eq. No. (10), we have

720 Y = 45000 y = 50000 y—5000 y
= Radius of Jambudvipa—radius of Meru's base on flat earth
= Shortest distance of earth's axis from periphery of Jambudvipa.
= $90°—23°.5$ (periphery of Jambudvipa coincides with maximum declination δ max of Sun).
= $66°.5$.

This result is tout a fait consistent with eq. No. (8) i.e.
510 Y = 2 δ max = 47°

In the light of these discussions, it may be contemplated that the variation of Sun's declination was deliberately measured in 510 Y in a manner as discussed earlier. Jainas were probably afraid of the insecurity of reckoning the variation of Sun's declination from zero (corresponding to Sun's position on Summer solstice day) to 510 Y (corresponding to Sun's postion on winter solstice day). Thus to avoid the act of defining the place of zero declination, they might have been tempted to befit these data in their pre-conceived cosmographic frame-work of mind. Consequently the concept of NPD of the solar *mandala* as implied in Jaina canonical texts came into existence thereby. The two Units, Y and y, were intermingled. Primarily, D_j was confused with while calculating the NPD of the innermost solar *mandala* (see eq. No. 9). This happened probably because according to their original findings, circumference of Jambudvipa was considered to be

[13] See Ref. No. 1.

situated 180 Y (stretch of 65 solar *mandalas* in Jambudvipa as per Jaina canonical texts) inside the sea coast of the inhabited land. Consequently the innermost *mandala* (Sun's diurnal circle on Summer solstice day) whose projection on earth coincides with circumference of Jambudvipa (as per our exposition) was considered to be situated 180 Y inside the coast of Lavanasamudra. But due to later interpolations it became customary to consider as if the innermost solar *mandala* (Sun's diurnal circle on Summer solstice day) were situated 180 Y inside Jambudvipa. Consequently the error was introduced due to subtraction of 180 Y from 45000 y (radius of Jambudvipa minus radius of Meru's base on flat earth) while calculating distance of innermost solar *mandala* from periphery of Meru's base on flat earth (NPD of innermost solar *mandala*) (see eq. No. 9). It is our speculation based on the dictum : exitus acta probat (result proves the act). Secondarily, a further error crept in while the rate of variation of Sun's declination from zero to 510 Y was equated with the rate of variation of NPD without making any allowance from compatibility between the two diverse scales of measurement of length. Such an intermingling of units Y (*Yojana*, *TP* unit) and y(*ātma-yojana*, *ADS* unit) has hitherto remained as a crux of immense confusion for research into this field.

(iv) *Dimensions of Solar Mandalas :*

As regards the dimensions of solar *mandalas* (Sun's diurnal paths), it is explicitly stated in *SP*.1.8 as :

"All the (solar) *mandalas* are $\frac{48}{61}$ *Yojanas* thick each. The distance between any two (consecutive) *mandalas* is 2 *Yojanas*. The distance of 510 *Yojanas* is to be treaded upon (by Sun) in 183 days.

"What is the distance between the inner limit of the innermost *mandala* (Sun's diurnal circle on Summer solstice day) and the outer limit of the outermost *mandala* (Sun's diurnal circle on Winter solstice day) ?

"(The answer is) 510 $\frac{48}{61}$ *Yojanas*."

This shows that the average velocity of Sun in the north-south direction across the solar *mandala*

$= 510$ Y / 183 days

$= 2\frac{48}{61}$ Y / days.

The north-south stretch of a solar *mandala* $= 2\frac{48}{61}$ Y

Now distance between two consecutive *mandalas* $= 2$ Y

Thickness of a solar *mandala* $= \frac{48}{61}$ Y.

This alludes to the notion that a solar *mandala* inherently implies a notion of the strap of diurnal path described by the solar disc. Thus the north-south breadth (as per Jaina canon being called as 'Thickness' heretofore) of the strap of a solar *mandala* is $\frac{48}{61}$ Y. However the distance between the inner limit of the innermost *mandala* (Sun's diurnal path on Summer solstice day) and the outer limit of the outermost *mandala* (Sun's diurnal path on Winter solstice day) is $510\frac{48}{61}$ *Yojanas*.

Let M_n denote nth solar *mandala* (Sun's diurnal path) beginning from innermost solar *mandala* where n is a natural number such that $1 \leqslant n \leqslant 184$. Thus

M_1 = Innermost solar *mandala*
M_2 = Second to innermost solar *mandala*.
M_n = nth solar *mandala*.
M_{184} = Outermost solar *mandala*.

The whole pattern of solar *mandalas* is shown below :

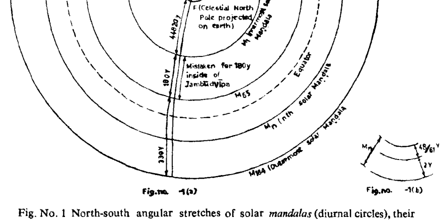


Fig.no. 1(a) Fig.no. 1(b)

Fig. No. 1 North-south angular stretches of solar *mandalas* (diurnal circles), their distances from periphery of Meru's base on flat earth measured in linear measures along the surface of flat earth. (N. B. However actual determinations fit the actual geometry of earth as per Jaina canonical texts.)

Besides, diameters and circumferences of all the solar *mandalas* are also stated in *SP* 1.8 as ;

i.e., "When the Sun treads upon the innermost *mandala* (Sun's diurnal circle on Summer solstice day), the *mandala* has $\frac{48}{61}$ *Yojanas* thickness (north-south breadth of the strap of diurnal path described by the solar disc), 99640 *yojanas* diameter and a slight more than 315089 *yojanas* circumference.

"...... Second to the innermost *mandala*, ... $\frac{48}{61}$ *Yojanas* thickness, $99645\frac{35}{61}$ *yojanas* diameter and a slightly less than 315107 *yojanas* circumference.

"Likewise, treading upon *mandala* to *mandala*, when the Sun moves on the outermost *mandala* (Sun's diurnal circle on Winter solstice day), the *mandala* has $\frac{48}{61}$ *Yojanas* thickness, 100660 *yojanas* diameter and 318315 *yojanas* circumference."

The dimensions of solar *mandalas* can easily be computed as follows:

$$\text{Radius} = \frac{\text{Diameter}}{2}$$

$$R_{M_n} = \frac{D_{M_n}}{2} \qquad \text{... (11)}$$

Where R_{M_n} = Radius of the M_n (nth solar *mandala*) or

D_{M_n} = Diameter of M_n

Now for the innermost solar *mandala* M_n we have

$$R_{M_1} = \frac{99640}{2} = 49829 \text{ y}$$

$$= 44820 \text{ y} + 5000 \text{ y}$$

$$= \text{NPD of } M_1 + \text{Radius of Meru's base on flat earth.}$$

Analogically, we have

$$R_{M_n} = \text{NPD of } M_n + \text{Radius of Meru's base on flat earth.}$$

Differentiating both sides w.r.t time t, we have

$$\frac{d}{dt}\left(R_{M_n}\right) = \frac{d}{dt}\ (\text{NPD of } M_n) + O \qquad \text{.........} (12)$$

(Radius of Meru's base on flat earth remains constant.)

Thus the rate of variation of radii of the solar *mandalas* is in toto the same as the rate of variation of their north polar distances (NPD) from periphery of the mount Meru's base on flat earth.

So using Eq. No. (3), we have from Eq. No. (12) that

$$\frac{d}{dt}\left(R_{M_n}\right) = 2\frac{48}{61}\ \text{Y/day (day and night)}$$

Using Eq. No. (11), we have

$$\frac{d}{dt}\left(D_{M_n}\right) = 5\frac{35}{61}\ \text{Y/days} \qquad \text{.........} (13)$$

i.e. diameters of the solar *mandalas* vary as $5\frac{35}{61}$ *yojanas* per day (day and night).

The circumference of any solar *mandala* has verily been computed in an alike manner as R.C. Gupta[14] has shown in his paper 'Circumference of Jambudvipa in Jaina Comography' that circumference of Jambudvipa had been computed from its diameter by using only approximate values of π. They had commonly employed the following formula

$$C_{M_n} = \sqrt{10\, D^2_{M_n}}$$

or

$$C_{M_n} = \sqrt{10}\ D_{M_n} \qquad \text{.........} (14)$$

where C_{M_n} =Circumference of M_n (nth solar *mandala*).

But they did not use the correct value of the square root of ten but instead, for finding out the square root of a non-square positive number N, the following bionominal approximation was frequently used during the ancient and medieval times ;

[14] Gupta, R. C. (1974), 'Circumference of Jambudvipa in Jaina Cosmography', *IJHS*, Vol 10, No. 1, pp. 38-46.

$$N = \sqrt{(a^2 + x)} = a + \left(\frac{x}{2a}\right) \qquad \ldots\ldots(15)$$

Where a and x are positive integers and the remainder x is less than the 'divisior' 2a ; otherwise or alternatively, we may use

$$N = \sqrt{(b^2 - y)} = b - \left(\frac{y}{2b}\right) \qquad \ldots\ldots(16)$$

The approximation (15) was known to the Greek Heron of Alexandria (between c.50-C.200 A.D.),[15] and even to the ancient Babylonians.[16] The Chinese Sun Tau (between 280 and 473 A.D)[17] while extracting the square root of 234567 by a elaborate method, finally said : [18]

"Thus we get 484 for the square root in the above and 968 for the hsia-fa, the remsiner being 311."

Thus we have the answer : $484 + \frac{311}{968}$ which is equivalent to what we get by using the Eq. No. (15).

The Jaina Gem Dictionary[19] gives the same rule as represented by Eq. No. (15). The *TP* 1.117 (Vol. I)[20] implies that the circumference of a circle of diameter one *yojana* was found out to be $\frac{19}{6}$ *yojanas*, which is in agreement with the use of the eq. No. (15) as we have

$$\sqrt{10} = \sqrt{(3^2+1)} = 3 + (\tfrac{1}{6})$$

Likewise, using Eq. No. (15) or alternatively Eq. No. (16), the given circumferences of the solar *mandalas* can easily be generated. Exempli gratia, we may see that

$$C_{M_1} = \sqrt{10\, D^2_{M_1}} = \sqrt{10 \times (99640)^2}$$

$$= \sqrt{(315090)^2} - 412100 \qquad \text{(using eq. No. 16)}$$

[15] Cf. Smith, D.E., *op. Cit.*, p. 254.

[16] Cf. Boyer, C. B. (1968), *A History of Mathematics*, p. 31.

[17] See *ISIS*, Vol. 61, Part 1 (1970), p. 92.

[18] Cf. Mikami, Y. (1961), *The Development of Mathematics in China and Japan*, (Chalsea reprint, New York).

[19] *The Jaina Gem Dictionary*, pp. 154-155. Quoted by Gupta, R.C., *Op. Cit.*

[20] Cf. *TP* 1.117 (Vol. I), edited by Upadhye, A. N. and Jain, H. L. (1936), p. 14.

$$= 315090 - \frac{412100}{630180}$$

= Slightly more than 315089 y (given)

Now a passing reference may be made about the distance between two Suns always remaining diametrically opposite on both sides of Meru. In this context, *SP*.1.4 states as :

i.e. "When the two Suns tread upon the innermost (solar) *mandala*, they move 99640 *yojanas* apart from each other."

Here it is given that
distance between two Suns moving on $M_1 = 99640$ y
$= DM_1$

= Diameter of innermost solar *mandala*.

A similar treatment holds good in case of any other solar *mandala* also. However this reveals the fact that the celestial angular distance between two Suns was measured in *yojanas* in terms of its corresponding distance projected along the surface of earth.

2. *Lunar Mandala (Moon's Diurnal Circles) :*

It is fascinating to note that the theory of solar *mandalas* (Sun's diurnal circles) excercised a staunch impact upon the emergence of the parallel theory of lunar *mandalas* (lunar diurnal circles). Such an exordial note to the conclusiveness of the theory of lunar *mandalas* renders it more undeplorable and easily graspable. Besides, some short-out methods have been put in practice in order to avoid unnecessary repitition of mathematical logic for exposing the rationale of some aspects of theory of lunar *mandalas* parallel to those of theory of solar *mandalas*. Due emphasis has been laid upon the newness of lunar *mandala* theory in particular.

(i) *Number of Lunar Mandalas (Lunar **Diurnal** Circles) :*

There are 15 lunar *mandalas*. In this context, *JP*.7.17 states as :

"There are 5 lunar *mandalas* (diurnal circles) stretched over 180 *yojanas* in Jambudvipa. There are 10 lunar *mandalas* stretched over

[11] See Shastri, N. C., 'The Jaina Pancanga', *Jain Siddhant Bhaskar*, Vol. 8, No. 2.
See also Das, S. R., 'The Jaina Calendar', *The Jain Antiquary*, Vol. 3, No. 2.

330 *yojanas* of the Lavanasamudra. Thus in both Jambudvipa and the Lavanasamudra there are 15 lunar *mandalas* (lunar diurnal circles) in all."

The total north-south stretch across the lunar *mandalas* $= 180 + 330 = 510$ Y.

(ii) *Linkage of Lunar Mandala with Moon's Sidereal Course among the Stars :*

Like the theory of two Suns, two Moons were considered to rise alternatively in southern quarter of Jambudvipa. As regards their motion in different lunar *mandalas SP.* 81 (*Gaṇitānuyoga*, pp. 284-286) states as :

"There are seven half-*mandalas* viz. 2nd, 4th, 6th, 8th, 10th, 12th and 14th in which Moon moves at the time of entering into the southern part (of Jambudvipa).

"There are $6\frac{13}{67}$ half-*mandalas* viz. 3rd, 5th, 7th, 9th, 11th, 13th and $\frac{13}{67}$ the part of 15th (lunar *mandala*) in which Moon moves at the time of entering into the northern part (of Jambudvipa)."

In this way, the first, *cāndrāyana* (Moon's southern course among the stars) is over.

Thus the same Moon moves on 7 plus $6\frac{13}{67}$ i.e. $13\frac{31}{67}$ half-*mandalas* in one *cāndrāyana* (half the sidereal revolution of Moon). According to Jaina theory of two Suns and two Moons etc., the counter Moon also moves on $13\frac{13}{67}$ half-*mandalas* at the same time.

The total number of lunar *mandalas* in one *cāndrāyana* (half the sidereal revolution of moon) $= 13\frac{13}{67}$.

We know that a quinquennial *yuga* (cycle) contains 67 *nakṣatra* months (lunar sidereal revolutions) or 134 *cāndrāyanas.*

Total number of lunar *mandalas* in a five-year cycle.

$= 13\frac{13}{67} \times 134 = 1768$

= The number of lunar *sāvaṇa* days (moon-rises to moon-rises) in a five-year cycle.

This indicates that the total number of lunar *mandalas* (lunar diurnal circles) in a five-year cycle has a one-one correspondence with the total number of *sāvaṇa* days (a *sāvaṇa* day means the period from moon-rise to moon-rise) in the same period (5-year cycle). Thus a lunar *mandala* (lunar diurnal circle) is traversed in a lunar *sāvaṇa* day (moon-rise to moon-rise).

Velocity of Moon = 1 lunar *mandala*/lunar *sāvaṇa* day...........(17)

Besides, it seems plausible that analogus to $\frac{13}{67}$ th part of the 15th lunar *mandala* (outermost lunar *mandala*), there must exist only the $\frac{13}{67}$th part of the first lunar *mandala* (innermost lunar *mandala*) upon which the Moon traverses its path in the northern part of Jambudvipa at about the ending moments of second-*cāndrāyana* (Moon's sidereal northern course) such that it again starts its southern journey while entering into the southern part of Jambudvipa as before. It is intended to impress upon here that there are 15 straps of lunar *mandalas* (lunar diurnal circles) and 14 spaces enclosed therebetween. Thus the Moon during its sidereal revolution moves twice upon 13 lunar *mandalas* and only once upon $\frac{13}{67}$ th part of each of the extreme lunar *mandalas* viz. the 1st and the 15th.

(iii) *Dimensions of Lunar mandalas :*

As regards the dimensions of lunar *mandalas*, *JP* 7.21 states as :

"What are the diameter and the circumference of the innermost (lunar) *mandala* (lunar diurnal circle corresponding to Moon's extreme northern position) ?

"(The answer is) 99640 *yojanas* diameter and slightly more than 315089 *yojanas* circumference.

"What about second to the innermost *mandala* ?

"$99712\frac{51}{61}+(\frac{1}{61}\times\frac{1}{7})$ *yojanas* diameter and slightly more than 315319 *yojanas* circumference.

"What about third to the innermost *mandala* ?

"$99785\frac{41}{61}+(\frac{1}{61}\times\frac{1}{7}\times\frac{2}{1})$ *yojanas* diameter and slightly more than 315549 *yojanas* circumference.

"So likewise when the Moon goes on advancing, the diameter goes on increasing by $72\frac{51}{61}+(\frac{1}{61}\times\frac{1}{7})$ *yojanas* per *mandala* and the circumference increases by 230 *yojanas* per *mandala*.

"What about the outermost (lunar) *mandala* (lunar diurnal circle corresponding to Moon's extreme southern position) ?

"1006600 *yojanas* diameter and 318315 *yojanas* circumference."

One may find at first sight that dimensions (diameter and circumference only) of the extreme lunar *mandalas* (innermost lunar *mandala* and outermost lunar *mandala*) are exactly the same as those of the corresponding extreme solar *mandalas* (innermost solar *mandala* and outermost solar *mandala*). Therefore distances of the extreme lunar *mandalas* from periphery of Meru's base on flat earth are also the same as those of the corresponding extreme solar *mandalas*. The dimensions (diameter, circumference, NPD from Meru) of lunar *mandalas* other than extreme ones are generated alike to the computation of those of the similar (other than extreme one) solar *mandalas*. However it is to be noted that we are given that

Rate of change of diameter of lunar *mandalas*
$=72\frac{51}{61}+(\frac{1}{61}\times\frac{1}{7})$ *Yojanas*/lunar *sāvaṇa* day (time taken by Moon to traverse one lunar *mandala*).

Rate of change of radius of lunar *mandalas*

$=\frac{1}{2}\ 72\frac{51}{61}+(\frac{1}{61}\times\frac{1}{7})$ *Yojanas*/lunar *sāvaṇa* day....... ....(18)

Since the radius increases 14 times (corresponding to 14 spaces between extreme lunar *mandalas*) till the Moon occupies 15th lunar *mandala* in its southern journey and vice versa, so total change (increase or decrease) of radii of lunar *mandalas*

$= 14 \times \frac{1}{2}\ 72\frac{51}{61} + (\frac{1}{61} \times \frac{1}{7})$ *Yojanas* (using eq. No. 18)

$= 509\frac{53}{61}$ *Yojanas*..(19)

Thus the distance between outer limit of innermost lunar *mandala* and outer limit of outermost lunar *mandala* $509\frac{53}{61}$ *Yojanas.*

Besides, as regards the thickness of every lunar *mandala, JP.*7.19 states as :

i.e. "What are the diameter, circumference and thickness of a lunar *mandala* ?

"Every lunar *mandala* is of $\frac{56}{61}$ *Yojanas* diameter, a little more than three times it circumference and $\frac{28}{61}$ *Yojanas* thickness."

In fact, these dimensions of every lunar *mandala* appear to be dimensions of the lunar disc. Like the fact that north-south breadth of strap of diurnal path of Sun in any solar *mandala* was equivalent to the diameter of the solar disc, analogically we may take that diameter of the lunar disc i.e. $\frac{56}{61}$ *Yojanas* denoted the north-south breadth of strap of the lunar path. Therefore the distance between the outer limit of outermost lunar *mandala* and the inner limit of innermost lunar *mandala* is the sum of $509\frac{53}{61}$ *Yojanas* and the breadh of strap of innermost lunar *mandala* ($\frac{56}{61}$ *Yojanas*) and it is equal to $510\frac{48}{61}$ *Yojanas.* Thus the extremities of the extreme lunar *mandalas* (outer limit of the outermost lunar *mandala* and inner limit of the innermost lunar (*mandala*) are in toto coincident with the corresponding extremities of the corresponding extreme solar *mandalas* as shown below :

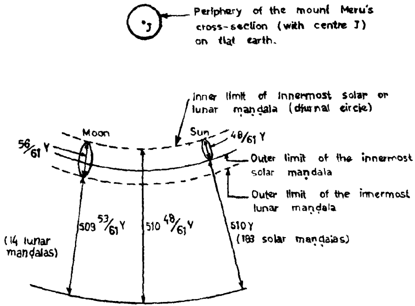


Fig. No. 2 North-south angular distances (projected over surface of earth) between extreme solar and lunar mandalas (diurnal circles) respectively as implied in Jaina canonical texts. (N. B. This exposition related to a situation prior to the development of notion of celestial latitude of moon.)

In the light of this discussion, it may be contemplated that lunar *mandala* theory has been developed on the guidelines of solar *mandala* theory. The notion of declination is equally implied in the concept of lunar *mandala* (diurnal circle of Moon).

[This paper had been accepted for presentation at the 15th International Conference on History of Science, Edinburgh, Scotland]

References to Jaina Pontiffs in the Bijolia Inscriptions of V.S. 1226

KRISHAN GOPAL SHARMA

The proper object of the Bijolia inscription of V.S. 1226 is to record the erection of a temple to Parsvanatha by a pious Digambara Jain named Lolaka. Its importance lies in the long list it supplies of the princes of the Imperial Cauhan dynasty of Sambhar and Ajmer. The early part of the inscription contains elaborate descriptions of the achievements of some Jaina pontiffs. Historically they are of minimal value but they throw some light on Jaina mythology.

The inscription[1] opens with a salutation to Vitaraga in a small prose sentence[2] and in its first verse adoration is paid to the divine light produced in the supreme soul which, it is said, has manifested itself in the form of the formula *syāt*.[3]

The second verse of the inscription makes allegorical reference to the first Jaina Tirthankara, Rsabhadeva. It reads with letters broken at several places : *nāstam gatah kugrahasaṅgraho na no tīvratejā ....* (*vah*). ....*naiva suduṣṭa dehopūrvvo ravi stātsamudevṛṣo vah.*

The word '*vṛṣe*' here indicates the name of Rsabhadeva who (by breaking the euphonic combination) is to be regarded as *avṛṣa* i.e. not having to ascend the second sign of the Zodiac, in contrast to the sun.

The third verse highlights the benevolent nature of Santinatha, the sixteenth pontiff. It reads : *bhūyācchrīśāntih śubhavibhavabhaṅgibhavabhṛtām vibhoryasyābhāti sphuritanakharocih karayugam. vinamrāṇāmeṣāmakhilakṛtinām maṅgalmayīm stharīkarttum lakṣmīmuparacitarajjuvrajamiva.* There was the sage Santinatha whose both beautiful hands with brilliant nails stretch out to cherish and satisfy the accomplished

[1] The reading and interpretation of the text given here is based on Akshayakeerty Vyas' paper 'Bijholi Rock Inscription of Cahamana Somesvara : V. S. 1226' published in *Epigraphia Indica*, Vol. XXVI, pp. 84-102.

[2] *om namo vitaragaya.*

[3] *cidrupam sahajoditam niravadhim jnanaikanistharppitam nityonmilitamullasatparakalam syatkaravispharitam (.) suvyaktam paramadbhutam sivasukhanandaspadam sasvatam naumi staumi japami yami saranam tajjyotiratom(tthi)-tam.*

goddess (Laksmi) of happiness for the people of the world blessed with sons and prosperity, and for those fortunate (or learned) men bending low with humiliation like the decorated ground of Braja for Laksmi, the spouse of Visnu, to sport upon.

The fourth verse recounts the glorious achievements of Neminātha, the twenty-second apostle : *nāsāśvāsena yena prabalabalabhṛtā pūritah pāñcajanyah.... varadalamali (—ni pāda) padmāgradesaih. hastānguṣṭhena śārṅgam dhanuratulabalam kṛṣṭamāropya viṣṇo raṅgulyādolitoyam hala bhṛdavanatim tasya nemestanomi.* Here it is said that he blew the Pancajanya conch of Lord Krsna by means of the breath of his nose, pulled his bow Sarnga with his thumb and shook Kalabhrta with his finger. "This", writes kaviraj Shyamal Das, "is an allusion to Neminatha's having gone to Dvaraka where Krsna lived, and blowing his conch and stringing and whirling his bow —each of which was unwieldy for anyone else but Visnu himself."[4]

The fifth verse makes a vivid description of the lecture-ground of Parsvanatha which, it is said, is gazed upon by the curious spectators, the fore-part of the lofty rampart of which is closely crowded with the leading gods, and which is surrounded on all sides with streamers, brilliant with the sun-gem and rendered vocal with jingles of bells. : *prānśuprākārakāntā tridaśaparivṛdhavyūha (ru) ddhāvakāśām vācālam ketukoti-(kva)-ṇadanaṇumaṇīkinkinībhih samantāt. yasya vyākhyānabhūmīmahaha kimidamityākulāh kautuken prekṣante prāṇabhājah (sa) (bhu) (vi) vijayatām tīrthakṛtapārśvanāthah.*

The sixth verse bestows well-wishes on Vardhamana Mahavira : *varddhatām varddhamānasya*[5] *vardhamāna mahodayah. varddhatām varddhamānasya*[6] *vardhamana (mah-) odayah.* The author here makes a display of his poetical talent. He repeats the same line twice which admits of a double meaning.

In verse seventh is adored the goodess of speech under two of her appellations, Sarada and Bharati.[7]

[4] Shyamal Das, 'The Antiquity, Authenticity and Genuineness of the Epic called the Prithviraj Raso as commonly ascribed to Cand Bardai', Appendix, Inscription No. 1, *Journal of the Asiatic Society of Bengal*, Vol. LV, Pt. 1, p. 28.

[5] Cf. Varddhamana i e. Mahavira.

[6] Cf. The town of Varddhamana with which is associated the birth of Mahavira.

[7] Cf. *saradam saradam staumi saiudanavisaradam bharatim bharatim bhaktabhuktimukti visaradam*

The verses eighth and ninth sum up the whole account in the following words :

nihpratyūhamupāsmahe jinapatīnanyānapi svāminah
śrīnābheyapurassarān parakṛpāpīyūṣapāthonidhīn.
ye jyotihparabhāgabhājanatayā muktātmanāmā(śri) tāh
śrīmanmuktinitambinīstanataṭehāraśriyambhibhrati.

bhavyānām hṛdyābhirāmavasatih saddharma..
sthatih karmonmulanasaṅgatih śubhatatih nirbbādha-bodhodhṛtih
jīvanāmaupakārakāraṇaratih śreyah śriyām saṁsṛti
deyānme bhavasambhṛtih śiva (ma) tim jaine caturvviṁśatih.

The whole description thus ends on an invocatory note : 'O ye twenty-four Tirthankaras....ye guide us aright into good action.'

Acarya Aryabhata

V. G. NAIR

There is substantial and trustworthy literary evidence to prove that Aryabhata, the celebrated mathematician and astronomer was a Jaina ascetic reputed for his vast studies in religious scriptures, acute intellect and spiritual wisdom. The Acarya was born in A.D. 499, near about the famous rock-cut natural Jaina cave temple called Kallil in Methala village, Ernakulam district, Kerala. But it is unfortunate that epigraphical and archaeological evidences are not available in support of the accepted traditional view that Aryabhata professed the Jaina faith and he was an ascetic famous in Kerala and other parts of India for his marvellous attainments in the untrodden fields of mathematics and astronomy unknown to the Western world and other Asian countries. Some scholars have disputed the claim that Aryabhata was not a Jaina Sadhu but he was a Hindu Vedic Scholar. These critics have failed to prove their claim on the basis of trustworthy evidences from current tradition, literature, epigraphy and archaeology.

Let me at the outset, unearth the available evidences from Jaina religious literature although they are inferential and indirect information to prove my claim that Aryabhata was a Jaina ascetic born in Kerala.

There were several Jaina Sadhus in the past centuries with an affix of Arya to their proper names. To illustrate a few among them they are Arya Vajra Svami, Arya Suhasti and Arya Malayagiri, who were reputed scholars and authors on Jaina philosophy and culture. Bhagavan Mahavira was known as Arya and Bhatesvara, besides, his other numerous names mentioned in the scriptures. The first name signifies purity of life, nobility, advanced learning and supreme spiritual wisdom ; the second, as the chief Pontiff of all the Jaina Bhatas, temples and *mutts* and the most worshipful Lord of the Jainas. The Pontiffs of Jaina temples and *mutts* in Karnataka and Tamilnadu are called Bhatarakas even today. The fact that the name of Arya Bhata consisted of two separate words--Arya and Bhata would give credence to my claim that Acarya Arya Bhata was a Jaina ascetic. Arya and Bhata are traditional names of Jaina ascetics from Mahavira to the Sadhus down through the centuries.

The names of several Bhatas are mentioned in our religious literature. These Bhatas were both Hindus and also Jainas. To illustrate a few, they are Kumarila Bhata of Bihar, the noted Vedic scholar and Mimansaka ritualist, who committed self-immolation by burning himself to death in fire, in the presence of Adi Sankaracarya and Akalanka Bhata, the noted Jaina logician of Karnataka, who defeated several Vedic and Buddhist scholars and monks in debates held at Kanchipuram in Tamilnadu. A Bhata may be a layman or an ascetic either Hindu or Jaina. There are Bhatas among the Buddhists from the days of the Buddha. Bhatas are mostly Brahmins and they lived in many parts of India both in ancient and modern times. In Bengal, they are known as Bhattacarya, who are Brahmins. In Maharashtra they are called as Bhatas and in Kerala Bhatathiri, who are also Brahmins. Only the upper classes of people among the Hindus are entitled to hold the name or affix of Bhata, while the Sudras are prohibited to have this privilege under the laws of *Smṛtis*, the Code of Laws of Vedic culture controlling the *Varṇa Dharma*, the Caste System prevalent even today in modern India.

We have another Aryabhata born in A.D. 950. He is also the author of a number of literary works on mathematics and astronomy. It is believed that Aryabhata II was a successor of Acarya Aryabhata and also a native of Kallil in Kerala, and was a Jaina ascetic. But there is no authentic evidence in support of this view.

According to historians Jainism was the preponderating religious faith of Kerala people in the early centuries of the Christian era. On the basis of an old inscription, Prof. Nilkantha Sastri, the noted Indologist, has stated that there were forty thousand Jaina Sadhus in Kerala during the time of Ilamko Adigal in the 2nd century A.D. Ilamko, which meant the young prince, was the brother of Ceran Senkuttuvan, king of Kerala, who had his capital city at Vanchi, the modern Kodumkaloor. Ilamko was a Jaina ascetic and author of *Silappadikaram*, the Tamil classic depicting the life story of Kannaki, a Jaina lady endowed with spiritual wisdom and super-natural attainments or occult powers. Kannaki's husband Kovalan who was also a Jaina, was beheaded at Madurai on the order of the Pandyan king, charged with stealing the anklet of his queen, when Kovalan was found in the market place with an anklet offering it for sale. This anklet belonged to Kannaki. After husband's tragic death, she plucked out one of her breasts and threw it over Madurai town, which was partly burnt to ashes. The king and his queen died from remorse for sentencing an innocent man to death. After burning Madurai, Kannaki, retraced her steps from Madurai to Kerala, probably to have

the *darśan* of Ilamko Adigal at Vanchi. On her way to Vanchi, she remained for a few days at Palghat and its suburbs. Today, the Hindus are offering her worship in temples in the name of Bhagavati. There are a number of such temples in the Palghat area. Kannaki reached Vanchi and passed away underneath a tree. King Sen-Kuttuvan raised a temple in her honour at Vanchi. Today, this Kannaki temple has also become a Bhagavathi temple famous in Kerala. *Silappadikaram* composed by Ilamko Adigal in classical Tamil is known as the 'Story of the Anklet' in the western countries. Mahakavi Ullur Paramesvara Iyer, the noted poet of Kerala in his *History of Malayalam Literature* has stated that Bhagavathi worship commenced in Kerala after the advent of Kannaki in Cera land. There were several Jaina temples at Vanchi erected by Ilamko Adigal and the last one near about Guruvayur Krsna temple of the present day was destroyed by the Portuguese in a battle with the Maharaja of Cochin about 500 years ago according to Sri K. V. Krishna Iyer, the noted historian and epigraphist of Kerala.

Ilamko Adigal was the Sangha Nayaka of Kerala in his time, and there were more than 100 temples scattered in different parts of the land. The Kallil Rock-cut Jaina temple is believed to have been erected by Ilamko Adigal although there is no inscriptions to prove this view. But Kallil was a noted centre of Jaina studies and pilgrimage for several centuries.

Aryabhata, in the benedictory verse—*Maṅgalācaraṇam* of his work on Mathematics and Astronomy, the *Ariyabhaṭiyam* has invoked the blessings of Brahma and Parabrahma instead of the customary prayer to Mahavira or some other Tirthankara and it would prove that he was not a Jaina by faith, according to some of the critics but this view is erroneous. These critics are not aware of the fact that one of the cardinal doctrines of Jainism is *anekāntavāda* or non-absolutism and not *ekāntavāda* or absolutism. Even Eienstein's Theory of Relativity is not the final discovery in natural science but it is also relative according to the philosophy of non-absolutism. The pivotal concept of this philosophy is—consider, reconsider, conciliate, reconciliate, absorb and unite for avoiding all recriminations and misunderstandings, chaos and confusions, social disorders and global wars for the sustenance of peace. Accordingly, Jainism has absorbed several Hindu gods, goddesses and demi gods in its patheon. Jainas venerate and worship them as Sasanadevatas and Dikpalas. Yaksas and Yaksis are demi-gods of the Jainas. Mahalaksmi, Sarasvati or Padmavati, Visnu, the four-headed Brahma and Gomukha, Nandi of Siva, Ganesa, Kuvera and Cakresvari are equally

venerated and worshipped by the Jainas. We could see the images of these Hindu deities in some of the Jaina temples in India. In the Konaraka Hindu temple, Orissa, the images of Tirthankaras are worshipped along with Hindu gods. Parabrahma is the impersonal Supreme Self, the *Paramātmā* of Hindu philosophy, the All-powerful and Self-illuminating and All-knowing God and the *Jīvātmā* is the Eternal Soul of Jaina philosophy endowed with all the natural qualities of Parabrahma but encircled and entangled within the karmic atoms of human beings until it is emancipated from such karmic atoms and attains its original state of self-illumination, eternal bliss and peace, the supreme stage of *nirvāṇa* from the continued cycles of worldly life. The ultimate goal of Jainism and Hinduism is one and the same called *nirvāṇa* or *mokṣa* from the entanglements of worldly life and sufferings. Therefore, the benedictory verse of *Aryabhaṭiyam* has proved that Aryabhata was a non-absolutist Jaina philospher and that he was not an absolutist non-Jaina philosopher.

The only literary evidence from Sanskrit about the birth place of Aryabhata although it is ambiguous or indirect is from one Kellalur Nilakanta Somayaji, who lived in A.D. 1500. There is also another person called Puthumana Somayaji, A.D. 1431, who are commentators of *Aryabhaṭiyam*. Both these commentators are mentioned in the *History of Philosophy* edited by Dr. S. Radhakrishnan. But the birth-place and religious faith of these two Somayajis are not given by the Editor. My investigations have proved that both these persons are Nambudiri Brahmins of Kerala. I even doubted whether both are identical persons. But it is not a correct view. A Somayaji is a Nambudiri Brahmin who performs *somayajñas*, *yajñas* and other rituals to propitiate the Vedic gods, who numbered thirtytwo, according to the *Vedas*. There are a number of Somayaji Nambudiri families in Kerala the hereditary descendants of the ancient Somayaji Nambudiri Brahmins. But no such *yajñas* with animal sacrifices are performed in these days. Today, the Nambudiris are highly educated and formed a progressive community of Kerala.

Kellalur Nilakanta Somayaji has stated *aśmaka janapadajāta aryabhaṭācārya* which means that Aryabhata was born in the inhabited locality below a hill or rock called Kallil. In old Tamil and also in modern Malayalam Asmaka is Kallu or stone indicating a hill or rock and it is definite and trustworthy what Nilkanta indicated was the rockcut natural Jain cave temple at Kallil or on the hill. This view is supported by traditions current among the people.

I have seen the Jaina hill temples scattered in different parts of India. The Girnar and Mount Abu in Saurastra and Rajasthan, Palitana or Satrunjaya near Ahmedabad, Sikharji (Pareshnath) in Bihar and also the enchanting Ranakpur temple in Rajasthan. The localities below these temples are inhabited by persons engaged in petty trade and serving the temples. In the same way, Arya Bhata was born in the Janapada of the Kallil Jaina temple, inhabited by Jainas during his time.

Prof. A. N. Singh, Head of the Department of Mathematics and Statistics, Lucknow University in his learned thesis 'Scientific Thought in Ancient India' has stated that Aryabhata was born at Asmaka (but he has not defined the word nor given any information about Aryabhata's religion). The Acarya studied and carried out his researches at Pataliputra (modern Patna) the greatest centre of Jaina studies in the early centuries of the Christian era. At the age of twentythree he wrote the *Aryabhaṭiyam* a small work of 118 verses dealing with the main principles of mathematics and astronomy. The earliest work on Indian astronomy available to us is *Aryabhaṭiyam*. The astronomical works now available to us show that the Indians had attained a remarkable degree of perfection in astronomy and were ahead of all other nations in the world. The *Aryabhaṭiyam* which was written in A.D. 499 contains practically the whole of Arithmatic that we teach today in our High Schools."

Mr. A. L. Basham writes in *Indian Heritage*, Vol III : "The name of the mathematician who devised the simplified system of writing numerals is unknown but the earliest surviving mathematical texts—the anonymous Bakshali Manuscript which is a copy of the text of the 4th century A.D. and the terse *Ariyabhaṭiyam* of Aryabhata written in A.D. 449 presupposes it.

"Most of the great discoveries and inventions of which Europe is so proud would have been impossible without a developed system of mathematics. The unknown man who devised the new system was from the world's point of view, after the Buddha, the most important son of India."

This unknown man, was not Varaha Mihira, A.D. 587 and he must be Aryabhata, A.D. 449, although this fact has not been brought to light by scholars. Therefore, Aryabhata can be rightly acclaimed as the father of Mathematics and astronomy in the history of the world. The debt of the western World to Aryabhata and India cannot be overestimated. The fact that the Acarya wrote the *Aryabhaṭiyam* at the age of twentythree

is not a new achievement in view of the fact that there were Jaina Sadhus in the ancient days, who had composed great literary works at their young ages. This is an additional evidence to support my view that Aryabhata was a Jaina Sadhu having joined the Monastic order at an early age, eight or nine, and pursued his studies for several years, which is a traditional religious custom prevalent among the Jainas even today.

I may cite here the verdict of the greatest scholar of Kerala, Mahakavi Kodumgallur Kunhukuttan Thampuram, (a prince of one of the royal families of Kerala) on the contributions of Jaina Pandits for the advancement of learning the higher arts among the people of Kerala. The Mahakavi has declared that "the culture of Kerala especially in Medicine (*Ayurveda*), Astology and Agriculture was developed by the Jaina and the Buddhist Sadhus from whom the Kerala Brahmins, the Nambudiris studied these arts in the early centuries of the Christian era. The Brahmins became Pandits in *Ayurveda* and Astrology because of these studies under Jaina scholars who were respected by them. Some Brahmins became Jainas for obtaining enlightenment and wisdom from their studies under Jaina Sadhus, who converted many Keralite non-vegetarians to the vegetarian way of life." (*Keralam*, Chap 2).

More Sculptures from Bhagalpur

AJOY KUMAR SINHA

Adimithuna Images

The Jaina art[1] in India has its own colour. While the gods and goddesses in the Hindu and Buddhist religion show supernatural things, the images of Jaina Tirthankaras are purely in the human form.[2] They are neither polycephalic nor multihanded. But the sculptors of the Jaina images gave importance to the Jina's parents, a typical Indian feeling. A few images showing the figures of Jina's parents have come to light in the eastern and central India. The author of this paper has made a survey of such images and studied them in iconographical perspective.

Let us examine first the general features of such Adimithuna or Yugalia sculptures. The foremost feature is the presence of a couple, either in standing or sitting posture carrying children in their laps under a tree. They are surrounded by a number of children. Above the branches of tree, a lotus pedestal is placed, sometimes resting upon the lions back. On the lotus seat, Jina is shown seated in deep meditation in *padmāsana mudrā*. The trilinear umbrella over the Jina's head and a decorated halo behind are evidences of his godhood. His palms form the shape of a lotus-bud, an important *yoga-mudrā*. Except the Jina all the persons carved out in the image, are decked with all sorts of ornaments.

One such image is adorning the British Museum, London.[3] It is from Bihar. Next from Rajghat (Varanasi) is displayed in the Bharat Kala Bhavan, Benaras.[4] Two such sculptures have been kept in the Museum of Varendra Research Society, Rajshahi (Bangladesh).[5] In the National Museum, New Delhi[6] we have one such bronze icon from

[1] Shah, U.P., *Studies in Jaina Art*, Varanasi, 1955.
[2] Bhattacharyya, B. C., *The Jaina Iconography*, New Delhi, 1974 (reprint), p. xix.
[3] Sharma, B. N., *Jain Pratimayen*, New Delhi, 1979, p. 102.
[4] Arch, No. 212. (Bharat Kala Bhavan, Benaras)
[5] Sharma, B. N., *op. cit.*, p. 95-96.
[6] Arch. No. 75.196. (National Museum, New Delhi)

Bengal and one stone sculpture from the Northern India.[7] At least two such icons have been reported from the Central India.[8]

Recently, the author of this paper has noticed a masterpiece stone sculpture showing the Adimithuna along with Jina in the Sri Campapur Digambar Jain Siddhaksetra, Nathnagar (Bhagalpur).[9] It gives all iconographic details which we discussed earlier. (fig. 1) It is carved out in black basalt stone which is locally available in the Rajmahal and Kharagpur Hills. It measures 30.5 × 15.3 centimeters. It is quite in tact. It was discovered from a dried tank at Campanagar (a suburb of Bhagalpur town) in the year 1914 A.D.[10] The couple looks like a royal pair because they are heavily decked with beautiful ornaments. They are seated in *sukhāsana* pose. The ornamanted *vṛttabandhajaṭā-jūṭa* of the couple is quite attractive. Even the babies in their laps and children seated beneath are also provided with ornaments. The Jina is seated in the *yoga-mudrā* upon a well-decorated and ornamented throne. The trilinear umbrella over his *uṣṇīṣa* styled hair is quite unusual from the iconographic point. The author thinks that it shows some influence of local art.

According to some, such sculpture shows the Jina's parent[11] while others try to identify them as Yaksa and Yaksi.[12] The author of the present paper agrees with the first view. The seated Jina can be identified with Bhagavan Adinatha and the couple with his parents. We know Bhagavan Adinatha was born in the family of Kulakara Nabhi. He was the first king and the first Tirthankara.[13]

The Adimithuna, the parents of Bhagavan Adinatha has also been worshipped by the Jaina devotees because they gave birth to the founder of Jainism. The Bhagalpur Adimithuna image can be dated in c. 8th century A.D.

[7] Arch. No. 74.3491. (National Museum, New Delhi)
[8] Arch. No. 75.3377. (National Museum, New Delhi)
[9] Roychoudhury, P. C., *Bihar District Gazetteer, Bhagalpur*, Patna, 1962.
[10] Patil, D. R., *The Antiquarian Remains in Bihar*, Patna, 1963, p. 78.
[11] Sharma, B.N., *op. cit.*, p. 30.
[12] *Ibid.*, p. 53
[13] *Kalpasutra*, p. 205 ff.

Ancient Caubisi of Bhagavan Adinatha

The *Caubisī*[1] has a great religious importance in the Jaina pantheon. Generally, Bhagavan Adinatha or Rsabhanatha act as the *mūlanāyaka* (chief deity) in such iconic representations. The remaining twentythree Jinas encircle him either in the *khaḍgāsana* or in *padmāsana mudrā*. Rarely, a *caubisī* of Bhagavan Parsvanatha also met with. Actually the main purpose behind carving out such *caubisī* images lies in the fact to recognise Bhagavan Adinatha as cheif of the Jaina cult. It also simplifies the purpose of worshipping all the twentyfour Jinas at one place.

The town of Bhagalpur[2] (ancient Campapur) is wellknown to the Jaina community. The *caubisī* of Bhagavan Adinatha under study is enshrined in the Sri Campapur Digambar Jain Siddhaksetra, Nathnagar.[3] It was discovered alongwith several other ancient icons from a dried tank near Campanagar in the year 1914 A.D.[4] It is carved out into black basalt. It measures 61×30.05 centemeters. It is quite in tact. (fig. 2) Bhagavan Adinatha is seated upon a double petalled lotus pedestal in *padmāsana mudrā*. He is in deep meditation. His curly hair and *uṣṇiṣa* over it are similar to the image of Lord Buddha. Two Vidyadharas holding long garlands in their hands are flying over the Jina's head. The trilinear (*trichatra*) umbrella emerging behind his head is attractive. His Sasandevi Cakresvari and Yaksa Gomukha (in human form) are seen near him. All the remaining twentythree Tirthankaras are seated in *padmāsana mudrā* around the *mūlanāyaka* Bhagavan Adinatha. Two worshippers are seen near him. His *lāñchana*, the bull is carved out below the lotus pedestal. An elephant, however, is carved out on the otherside of the bull. In between the bull and the elephant a female deity has been carved out in the place of usual *cakra* (wheel of law). She is holding a baby in her lap and seated in *ardhaparyaṅkāsana*. Her *vṛttabandhajaṭājūṭa* is attractive. She may be identified as goddess Ambika, the Sasanadevi of Bhagavan Neminatha, the 22nd Jaina Tirthankara.

The depiction of goddess Ambika with the image of Bhagavan Adinatha is rare from the iconographic point of view. We have only similar example at the Archaeological Museum, Raipur, M.P.[5] Here the figure

1 Joshi, N.P., *Pracin Bharatiya Murtivijnan*, Patna, 1977, p. 214.
2 Roychoudhury, P. C., *Bihar District Gazetteer, Bhaglpur*, Patna, 1962.
3 Sinha, Ajoy Kumar, *Jaina Shrines in Bhagalpur*, Bhagalpur, 1983.
4 Patil, D. R., *The Antiquarian Remains in Bihar*, Patna, 1963, p. 78.
5 Shrama, B. N, *Jain Pratimayen*, New Delhi, 1979, p. 78.



Fig. 1



Fig. 2



Fig. 3

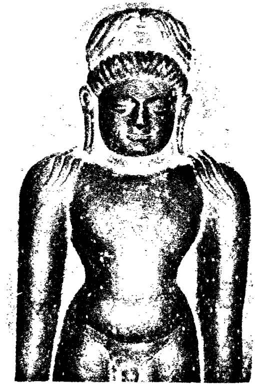


Fig. 4

of goddess Ambika has been carved out in place of goddess Cakresvari, probably due to her importance in the Jaina pantheon.

Besides, this *caubisī* of Bhagavan Adinatha is a sigular specimen of its type from the iconographic point of view, reported so far from the eastern part of Bihar. It can be dated in circa 8th century A.D.

A Rare Khadgasana Image of Bhagavan Adinatha

The stone image of Bhagavan Adinatha under study has been enshrined in Sri Campapur Digambar Jain Siddhaksetra, Nathnagar (a suburb of Bhagalpur Town). It is carved out in ashy black stone and measures 25.3×15.3 cms. (fig. 3) The black stone, however, has been referred to as best material to carve out the idols of Jaina Tirthankaras.[1] The image shows Bhagavan Adinatha standing in *kāyotsarga mudrā*, a typical yogic form prescribed in the Jaina canons. Actually, Jainism believes in penance (*tapasyā*).[2] The Jina's hands are hanging upto his knees. He is nude and youthful in look. The *srīvatsa* mark upon his chest is, however, not clear. All these features are according to the principles laid down in the *silpa* texts for carving out the idols of Jaina Tirthankaras during the early and medieval period.[3] The Jina's face is calm and serene in appearance accordingly.[4] He is standing upon a simple pedestal on which a *cakra* (wheel of law) in the form of simple dotted circle has been carved out just below the Jina's feet. The wheel is flanked by two bulls, the *lāñchana* of the Jina. His elongated ears, half closed eyes, tied heirs and a very simple trilinear umbrella (*trichatra*) over his head are clear-cut example of early sculptural art of the eastern India. The oval shaped *prabhāvalī* behind his head also shows simple linear design. On both sides of the standing Jina, we find a number of seated deities, which adds more importance to it. To his left side near the shoulder, his Sasanadevi Cakresvari is seated in the *padmāsana mudrā* upon a lotus pedestal. She is holding a *cakra* (wheel) as her emblem. On the right side, near Jina's other shoulder, Gomukha, the Yaksa is shown seated upon a lotus pedestal in the *padmāsana* attitude. The flying Vidyadhara emerging from Gomukha's back is attractive and important from iconographic point of view. One of his hand

1 *Pratisthasarasamgraha*, 3.77.

2 *sramyamtiti sramanah tapasyamtityarthah*, *Dasavaikalika Sutra*, 13.3.

3 *ajanulambabahuh srivatsyankaprasantamurtisca digvasastaruno rupavamsca kayor'hatam devah*, *Brhatsamhita*, 58, 45.

4 *santaprasannamadhyasthanasagrasthavikaradrk sampurnabhavarudhanuvidvang laksananvitam*, Pratisthasarodhhara, 1.62.

is in boon-giving (*varada*) pose. Just below the Sasanadevi Cakresvari, the Gandharva Yaksa has been carved out.[5] He is also seated upon a lotus flower in the *ardha paryaṅkāsana*. He is holding a snake in his right hand. On the other side, below the Yaksa Gomukha, we find the figure of Yaksa Kuvera seated in the *padmāsana* upon a lotus seat. He is holding a club accordingly. His *vṛttabandhajaṭājūṭa* is typical to the pre-Pala sculptural art of the eastern Bihar. In the lower most row, below the figure of the Gandharva Yaksa, figures of Jina's parents have been beautifully carved out. They are seated in the *sukhāsana mudra* upon a lotus seat. They are giving boon to the devotees. Above all, we find the figure of Yaksa Bhrkuti[6] on the other side of Jina's parent. Bhrkuti is associated with the bull and hence should be close to Bhagavan Adinatha. In the Jaina art of Bihar, this representation is rare from the iconographic point. A devotee, may be donor, has been carved out with the folded palms (*añjali mudrā*) upon a lotus seat in kneel down position.

The above mentioned description of the ancient *khaḍgāsana* Adinatha image proves its iconographic importance. It is singular example of its type inside the eastern part of Bihar. It definitely belonged to the circa 7th-8th century A.D. and hence of great archaeological importance too.

An Early Image of Bhagavan Adinatha

The earliest known Jaina stone sculpture of Bhagalpur is enshrined in the Sri Champapur Digambar Jain Siddhaksetra, Nathnagar,[1] a suburb of Bhagalpur town. It represents Bhagavan Adinatha or Rsabhanatha, the first and founder Tirthankara. (fig. 4) The temple itself is an old one and said to be constructed in V. S. 1559.[2] The statue of Bhagavan Adinatha is in *khaḍgāsana* pose. The sculptor followed the *śilpa* guidelines laid down by Vasunandi. Bhagavan Adinatha is standing with his feet at a distance of about two inches from each other and his hands resting naturally by the sides, definitely not touching his body. His *vṛitabandhajaṭājūṭa* (roundish hair style) reminds us of the iconographic tradition followed during the Gupta and late Gupta periods (c. 5th-7th century A.D.). Locks of hair, another pre-Pala feature,

[5] Bhattacharya, B. C., *The Jaina Iconography*, New Delhi, 1974 (Reprint), p. 97.
[6] *Ibid.*, p. 93.
[1] Matin, Mantgomary, *The History, Antiquities, Topography and Statistics of Eastern India*, Vol. II (London, 1837), p. 29.
[2] Patil, D. R., *The Antiquarian Remains in Bihar*, (Patna, 1963), p. 79.

are hanging over Bhagavana's both shoulders. The *śrīvatsa* mark is clear and his nudeness indicates that it belonged to the Digambara sect. The physical proportions of his body has beautifully been carved out in ashy granite stone which measures 96.5 × 48.3 centimetres. His elongated ears and a round mole mark over his forehead are also important iconographic features. The *dharmacakra* has been carved out just in the centre of the plain pedestal. His *vāhana*, the bull, is carved out by the side of the *dharmacakra*. It is curious to note that this idol of Bhagavan Adinatha has not been accompanied by any Yaksa or Yaksini. It belonged to the *circa* 5th-6th century A.D.

A Note on the Antiquity of the Adinatha Temple at Pulal

A. EKAMBARANATHAN

Pulal, a hamlet situated 9 miles north-west of Madras was a centre of Jainism and a temple was dedicated to Adinatha or Rsabhadeva, the first Tirthankara. The temple is completely renovated in recent times by the north-Indian Jaina pontiffs and hence the date of its origin cannot be easily ascertained from the present structure.

V. G. Nayar in his booklet on the Pulal temple, states that the antiquity of the temple can be traced back to the 1st century B.C., and he is also of the opinion that Tiruvalluvar, the author of *Tirukkural* offered worship to the presiding deity Adinatha. It is not clear on what grounds V. G. Nayar has dated the temple to the 1st century B.C., and associates Tiruvalluvar with the *basti* at Pulal. There is no epigraphic or other tangible evidence to show that the temple at Pulal was built during the 1st century of the pre-Christian era.

The Mackenzie Manuscripts, Vol III, edited by Dr. T. V. Mahalingam, (Manuscript No. 13, section 7, p. 96) makes mention of the Jaina temple at Pulal and associates it with the Kurumbars (a tribe). It is stated that "the Kurumbars of the Karnataka country spread over the Dravida country upto Tondaimandalam and set up their rule under the chieftainship of Kamanda, Kurumbaprabhu, Dravida-desatipati, Pulal-raja. They divided their country into twentyfour parts, built a fort in each and made Pulal their capital...Having been converted to Jainism by a monk, they built many Jaina *bastis* of which one bearing the name of the monk existed at Pulal, and the relics of others at Vikkinam Kalani and other places... They were anihilated by Adondaicola of Tanjore and Vellala people established in the country."

Section 2 of the same edition (p. 91) of the manuscript adds further information to our knowledge that Adondaichakravarti who extirpated the Kurumbars, was an illegal son of Kulottunga Cola. If the above said informations are reliable, we may have to place the Kurumbars in the 11th century A.D. (i.e. contemporary to Kulottunga.) Taking this into consideration, the same period may also be assigned to the Jaina temple at Pulal, built by the Kurumbars. (The historicity of the Mackenzie collection is subject to severe criticisms.)

In the *prakara* of the temple, there is a beautiful image of Adinatha, which may be dated on stylistic grounds to the 10th or 11th century A.D. Adinatha is flanked by two *cauri*-bearers on either side, his head is adorned by a *chatravalli* with three tiers, and the area adjoining it is filled with a creeper design. The eyes of the figure are suggestive of meditation, the lips are, deep-cut, the ears are elongated and the hands are kept in *yoga*-posture. The nose and the lower portion of the right arm are slightly damaged. It is possible to suggest that it should have been originally enshrined in the sanctum and after its mutilation, it should have been brought to the present place.

The *garbhagṛha* enshrines an image of Adinatha, slightly bigger in proportion, which in all respects resembles the other figure found in the *prakara*. This sculpture is highly polished and decorated and hence its date can not be easily determined.

The seven inscriptions (13th, 14th and 15th centuries A.D.) from Pulal (No. 482-488 of ARE 1920) are found in the Tirumulasthanam—Uḍaiyar (Siva) temple and they record land grants and other endowments made to the same temple during the time of Sambuvaraya and Vijayanagar kings. These inscriptions do not make any mention of the Jaina *basti* at Pulal or its Pallicchandam lands in this area.

So it is only from the Adinatha sculpture found in the *prakara*, we may tentatively fix the date of this temple to the 10th or 11th century A.D.

Our Contributors

SAJJAN SINGH LISHK, Govt. In-service Teacher Training Centre, Patiala.

KRISHAN GOPAL SHARMA, UGC Research Fellow, Deptt. of History & Indian Culture, University of Rajasthan, Jaipur.

V. G. NAIR, author and writer.

AJOY KUMAR SINHA, Bihar Education Service, Bhagalpur.

A. EKAMBARANATHAN, Dept of Archaeology, University of Madras, Madras.

Registered with the Registrar
of Newspapers for India
under No. R. N. 12121/66.

WB/NC-254
Winter 1984